Appendix 1.E. Efforts to Seek Information on Stored Gas Composition

In order to better assess the inventory of chemicals available for release from storage wells during a loss-of-containment (LOC) event, the health impacts team worked with the CCST and the CPUC to make a formal request to each of the storage facility operators for information on stored-gas composition. Contained in this Appendix are (1) a copy of the letter of request we sent out along with (2) the letters of response we received from Southern California Gas (operator of Aliso Canyon, Honor Rancho, La Goleta Gas, Montebello, and Playa del Ray), PG&E (operator of McDonald Island Gas, Los Medanos Gas, Pleasant Creek Gas), Rockport Gas Storage Partners (operator of Kirby Hills, Lodi Gas, and Wild Goose Gas), Central Valley Gas (operator of Princeton Gas), and Gill Ranch LLC (operator of Gill Ranch Gas). As an introduction to these attached materials, we discuss here briefly what we requested and what we got back.

Information we were seeking

As part of the health risk assessment and based on emissions reported and detected from the Aliso Canyon event, we compiled a table of priority chemicals (attached to our request letter below) that we determined would be in the stored gas at trace levels but relevant to public health. Our concern is that these trace constituents could come out with the natural gas during a LOC and might lead to exposures on-site (occupational) or to the nearest off-site community that could exceed health-protection guidelines. But the only way to make this determination is by having knowledge of concentrations of these priority chemicals in the stored gas.

In order to obtain this information, we asked first of the operators: “Please show the proportion of each chemical in parts per billion that is present in the gas after a standard operational withdrawal prior to any processing….” We followed this with a question about detection limits for assessing trace concentrations. If the operator could not fully address the first two questions, we included a third questions that asked why they were not monitoring for these chemicals, what are the barriers to more extensive monitoring, and what would it take to make feasible the monitoring of these chemicals

The responses we received

Although we received responses from all of the operators in California, their responses revealed an absence of both the information we requested and the ability to obtain this information in a timely manner. Some of the responses were terse and somewhat incomplete, others were more detailed but still failed to provide new insight about the current inventory of toxic air contaminants in stored natural gas. In reviewing the responses, it is clear that all of the operators are only currently monitoring for the quality of the gas and the presence of sulfur compounds. None measure for other toxic air contaminants. The operators had different responses with regard to the barriers to more extensive monitoring, and what it would take to make feasible the monitoring of these chemicals. Some indicated

that this would involve significant effort and as much as three months of preparation, whereas Rockport Gas Storage Partners stated that they could develop this capacity in about two weeks. Overall, the responses make clear that information on the levels of toxic air contaminants (other than sulfur compounds) will likely not be available without a mandate from the responsible regulatory agency or agencies.

Southern California Gas Company provided a rather detailed response to all the questions but stated that, among the chemicals listed our Tables 1 and 2, they are only currently capable of detecting hydrogen sulfide and mercaptans. They report that they do not routinely test for these compounds but have done spot tests, and they provided tabulated results of the spot tests. They noted limits of detection for hydrogen sulfide and mercaptans of 10 ppb by volume (ppbv) – above both odor thresholds and health-relevant concentrations. With regard to our third question (about why they were not monitoring for these chemicals, what were the barriers to more extensive monitoring, and what would it take to make feasible the monitoring of these chemicals), Southern California Gas had a lengthy answer. Their response noted that they currently only monitor the gas retrieved from the wells for energy content and gas quality. The main barrier to detecting chemicals beyond hydrogen sulfide and mercaptans is the lack of approved on-line analyzers that can monitor all the chemicals in Tables 1 and 2. They estimate that it would take three months just to assess the feasibility of the more extensive chemical sampling.

PG&E reported that they have only limited sampling data collection at their facilities prior to processing. The only non-gas constituents sampled for are hexane, hydrogen sulfide, mercaptans, tetrahydrothiophene, ethyl methyl sulfide, and dimethyl sulfide. Their reported limits of detection are 100 ppbv – significantly above the odor thresholds and health-relevant concentrations. With regard to why they do not monitor for chemicals on our Table 1 and 2, PG&E states that there is no requirement for this, but could make these measurements once they develop the appropriate on-line analyzers—taking about three months.

Rockport Gas Storage Partners responded to the information request by attaching a table showing what analysis methods are commercially available for each of the chemicals listed in our Tables 1 and 2. They did not provide any written response to our questions 1 and 2, but did respond in writing to our question about removing barriers and providing the requested analyses with a list of steps they would take to comply with this information need. They noted it would take them about two weeks to put this capacity in place.

Central Valley Gas Storage (CVGS) responded to the request for sampling data by stating that CVGS has very limited gas-composition-monitoring capability and relies on PG&E to monitor gas composition at a transfer point. CVGS detection limits are based on PG&E detection limits. With regard to barriers and future monitoring capacity, CVGS notes that it would be very expensive to deploy the requested monitoring, and that they would request state support if this were requested.

With the exception of sulfur compounds, Gill Ranch reports that they do not have instrumentation installed to detect low levels of the chemicals listed in our Tables 1 and 2. They monitor once a year for gas composition and for VOC levels (to comply with gas composition rules) and sulfur compounds. They did not provide limits of detection. They report that they do not monitor for chemicals in our Tables 1 and 2, because these chemicals do not have an operational impact, and their detection is not a regulatory requirement. Gill Ranch reports the main barrier to monitoring for these additional chemicals is a study to determine feasibility and cost.

California Public Utilities Commission

Data Request

May 30, 2017

To: Gas storage provider

Re: Chemicals in the natural gas withdrawn from natural gas storage facilities prior to processing.

The information below is being requested for the study on the long-term viability of natural gas storage undertaken by the California Council on Science and Technology pursuant to Senate Bill 826.

Please send the information to [Address specified] no later than June 13, 2017. Call (Number specified) regarding any questions.

++

Note: The term "chemicals" used below refers to the items listed in the tables shown in the appendix. The chemicals in Table 1 are considered high priority for the study. The CASRN column in the tables refers to the Chemical Abstracts Service Registry Number.

1) Please show the proportion of each chemical in parts per billion that is present in the gas after a standard operational withdrawal prior to any processing to bring the gas to utility pipeline standards from each well at the underground gas storage facility or facilities you operate in California. In your response, confirm that the data was taken from samples prior to any processing after the withdrawal.

2) Describe the limits of the capability of your monitoring instrumentation to detect the chemicals. What is the minimum quantity of the chemicals that your instrumentation can detect?

3) If you are not monitoring any of the chemicals,

a) Explain why the chemicals are not being monitored.

b) Describe any barriers that exist for monitoring the chemicals.

c) How soon could the barriers be removed and the requested data provided for the Table 1 and the Table 2 chemicals?

Table 1.E-1. Priority chemicals relevant to underground gas storage in California designated as 'must have' (n=16).

CASRN	Chemical Name
106-99-0	1,3-Butadiene
75-07-0	Acetaldehyde
107-02-8	Acrolein
7664-41-7	Ammonia
71-43-2	Benzene
56-23-5	Carbon tetrachloride
50-00-0	Formaldehyde
7783-6-4	Hydrogen sulfide
74-93-1	Mercaptan, Methyl
75-08-1	Mercaptan, Ethy
75-33-2	Mercaptan, Isopropyl
75-66-1	Mercaptan, t-Butyl
107-03-09	Mercaptan, Propyl
91-20-3	Naphthalene
127-18-4	Perchloroethylene
108-88-3	Toluene

Table 1.E-2. Additional priority chemicals relevant to underground storage in California (n=33).

CASRN	Chemical Name
71-55-6	1,1,1-Trichloroethane
95-63-6	1,2,4-Trimethylbenzene
7440-38-2	Arsenic
7440-41-7	Beryllium
7440-43-9	Cadmium
7782-50-5	Chlorine
18540-29-9	Chromium (VI)
108-90-7	Chlorobenzene
67-66-3	Chloroform
7440-50-8	Copper
106-93-4	Ethylene dibromide
107-06-2	Ethylene dichloride
107-21-1	Ethylene glycol
110-54-3	Hexane
7647-01-0	Hydrochloric acid
7439-96-5	Manganese
7439-97-6	Mercury
67-56-1	Methanol
75-09-2	Methylene chloride
7440-02-0	Nickel
108-95-2	Phenol
115-07-1	Propylene
75-56-9	Propylene oxide
129-00-0	Pyrene
7782-49-2	Selenium
7631-86-9	Silica, Crystalline
1310-73-2	Sodium Hydroxide
100-42-5	Styrene
79-01-6	Trichloroethylene
1330-20-7	Xylenes
108-38-3	m-Xylene
95-47-6	o-Xylene
106-42-3	p-Xylene